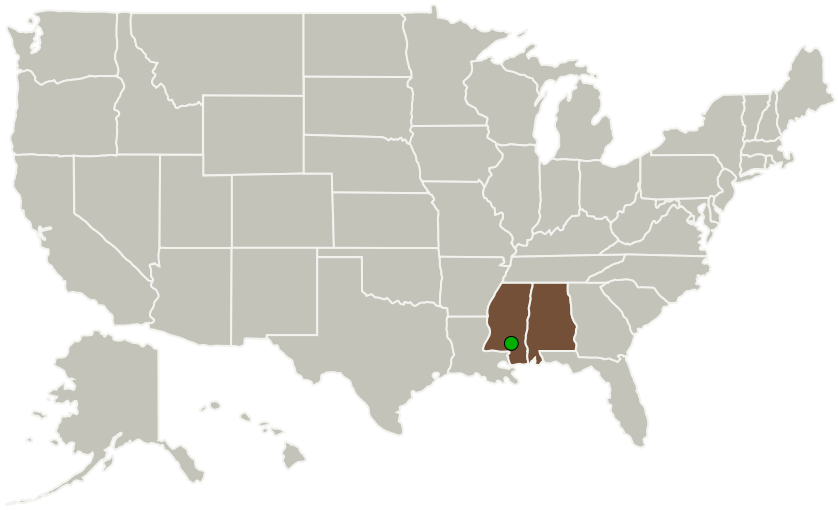
Energy Conservation and Sustainability, Technologies for Propellant Conservation, Phase I

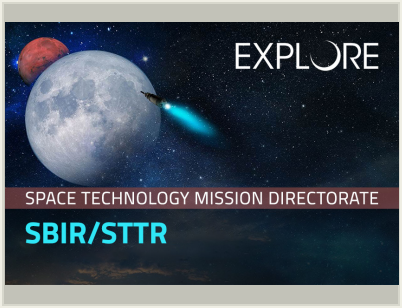
Completed Technology Project (2011 - 2012)

Project Introduction

NASA Stennis Space Center (SSC) is one of the largest consumers of gaseous helium in the world through its engine testing operations. Because helium is a nonrenewable resource, it is desirable to conserve the gas when possible. For safety purposes, helium is used to purge an engine following a test that utilizes cryogenic liquid hydrogen fuel (e.g. a Space Shuttle Main Engine test). This proposal is another important step toward enabling helium conservation through real-time measurement of the H2 concentration in the purge gas. The STTR will continue the characterization of a commercial H2 detector for use as a real-time sensor for determining the concentration of H2 in the helium purge gas. The H2 concentration can be used as an indicator that the liquid hydrogen has been purged from the engine, allowing the helium purge to be of shorter duration, thereby conserving this resource. Significant analysis of sensor capabilities as well as experimental characterization of the sensor performance in a simulated test-stand environment will be performed. A sensor configuration will be recommended with the goal of identifying the best installation option that avoids pumps, mechanical actuators, or the need to vent or pipe a sample if possible.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Radiance Technologies, Inc.	Lead Organization	Industry	Huntsville, Alabama
Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi
University of Southern Mississippi	Supporting Organization	Academia	Hattiesburg, Mississippi

Primary U.S. Work Locations	
Alabama	Mississippi

Project Transitions

February 2011: Project Start

February 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138130)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Radiance Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

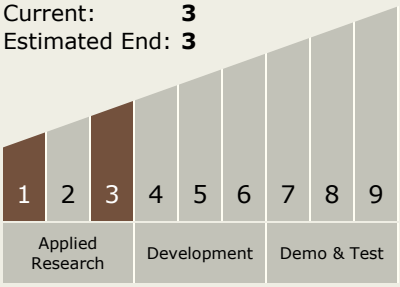
Carlos Torrez

Principal Investigator:

William C West

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
    - TX13.1.3 Commodity Recovery

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System